Heating	Bearings	Dirt or grit in bearings	A Wash out grit with oil while running, then clean up and put in order. Be careful about flooding commutator and brush holder. B Remove caps and clean and polish journals and bearings perfectly, then replace. See that all parts are free and lubricate well. C When shaft cools, if hot, then remove bearings and let them cool naturally, then clean, scrape and polish, assemble, see that all parts are free, and lub icate well.	26
		Rough journals or bearings	Smooth and polish in a lathe, removing all burrs, scratches, tool marks etc. and rebabbitt old boxes or fit new ones.	27
		Journals too tight in bearings; bent shaft	Slacken cap bolts, put in liners and retighten till run is over, then scrape, ream etc. as may be needed, bend or turn true in lathe or grinder Possibly a new box or shaft will be needed.	28 29
		Bearings out of line	Loosen bearing bolts, line up and block, until armature is in center of pole pieces, ream out dowel and bolt holes and secure in new position.	30
		End pressure of pulley hub or shaft collars	A See that foundation is level and armature has free end motion. B If there is no end motion, file or turn ends of boxes or shoulders on shaft to provide end motion. C Then line up shaft and belt, so that there is no end thrust on shaft, but that the armature plays freely endways when running.	31
		Belt too tight	A Reduce load so that belt may be loosened and yet not slip. Avoid vertical belts if possible. B Choose larger pulleys, wider and longer belts with slack side on top. Vibrating and flapping belts cause winking lamps.	32
		Armature out of center of pole pieces	A Bearings may be worn out and need replacing, throwing armature out of center See 36 B Center armature in polar space, and adjust bearings to suit. See 30 C File out polar space to give equal space all around. D Spring pole away from armature in place, this may be difficult or impossible in large machines.	33
Noises		Armature or pulley out of balance	Faulty construction, armature and pulley should have been balanced when made. May be helped by balancing on knife edges now.	34
		Armature strikes or rubs pole pieces	A Bend or press down any projecting wires, and secure with tie bands B File out pole pieces where armature strikes. See 30-33	35
		Collars or shoulders on shaft strike or rub box	Bearings may be loose or worn out. Perhaps new bearings are needed. See 30-31	36
		Loose bolt connection or screws	See that all bolts and screws are tight, and examine daily to keep them so	37
		Brushes sing or hiss	A Apply stearic acid (adamantine) candle, vasaline, or cylinder oil to commutator and wipe off, only a trace should be applied B Move brushes in and out of holder to get a firm, smooth, gentle pressure, free from hum or buss. See 3-6-7-8-9-31.	38
		Flapping of belt	Use an endless belt if possible, if a laced belt must be used, have square ends neatly laced.	39
		Slipping of belt from overload	Tighten belt or reduce load. See 32.	40
		Humming of armature lugs or teeth	A Slope end of pole piece so that armature does not pass edges all at once B Decrease magnetism of field, or increase magnetic capacity of tooth.	41
Speed	Runs too fast	Engine fails to regulate with varying load	Adjust governor of engine to regulate properly, from no load to full load, or get a better engine.	42
		Series motor; too much current, and runs away	A Series motor on constant current. (1) put in a shunt and regulate to proper current. (2) use regulator or governor to control magnetism of field for varying load. B Series motor on constant potential (1) Insert resistance and reduce current (2) use a proper regulator or controlling switch (3) change to automatic speed regulating motor.	43
		Shunt Motor: Regulator not properly set; Not proper current; Motor not properly proportioned	A Adjust regulator to control motor B Use current of proper voltage and no other, with a proper rheostat. C Get a better motor, one properly designed for the work.	44
	Runs too slow	See note below table	45 Same as 42 46 see A11 47 short circuit in armature, see 12. 48 rubbing armature, see 35. 49 friction, see B-3. 50 weak magnetic field, see 10.	
Motor	Stops or fails to start	Great overload See 11 - F and G Excessive friction See 25-33-35	Open switch, find and repair trouble. Keep switch open and rheostat "off" to see if everything is O.K. With series motor no great harm will result from failing to start or stopping. Shunt motor on constant potential circuit, fuse may blow or armature burn out.	51 52
		Circuit open: Fuse melted or switch open; Broken wire or connection; Brushes not in contact; Current fails or is shut off at station	A Find and repair trouble, after opening switch, then put in in fuse See 11-C. B Open switch, find and repair trouble See 13. C Open switch, and adjust. See 5. D Open switch, and return starting box lever to off position, wait for current.	53
		Short circuit of field; Short circuit of armature; Short circuit of switch	Test for, and repair if possible. Examine insulation of binding posts and brush holders. Poor insulation, dirt, oil and copper or carbon dust often result in a short circuit.	54 56
	Runs backwards	Wrong connections	Connect up correctly per diagram, if no diagram is at hand, reverse connections to brushes, or others until direction of rotation is satisfactory.	57
Dynamo or Generator	Reversed Residual Magnetism	Reversed current through field coils; Reversed connections; Earths magnetism; Proximity of another dynamo; Brushes not in right position see 31-2-3	A Use current from another machine or a battery through field in proper direction to correct fault. Test polarity with a compass. B If connections or windings are not known, try one way and test, if not correct reverse connections, try again and test. C Connect up per diagram for desired rotation, see that connections to shunt and series coils are properly made See 57. D Shift brushes until they operate better. See 1-2-3 E	58
		Too weak residual magnetism	Same as 58-A.	59
		Short circuit in machine	See 12-54-56	60
		Short circuit in external circuit	A lamp socket etc. may be short circuited or grounded, and prevent building up shunt or compound machines. Find & remedy before closing switch. See 54-56	61
		Field coils opposed to each other	Reverse connections of one of field coils and test. Find polarity with compass, if necessary try 58 A, C, D. If necessary reverse connections and recharge in opposite directions.	62
	Open Circuit	Broken wire; Faulty connections; Brushes not in contact; Safety fuses melted or broken; Switch open; External circuit open	A Search out and repair See 13. B " " " " See 37. C " " " " See 5. D " " " " See 53-A. E " " " " See 53-D F " " " " with dynamo switch open until repairs are completed.	63
		Too great load on dynamo	Reduce load to pilot lamp on shunt and incandescent machines, after voltage is obtained close switches in succession slowly, and regulate voltage. See IIA & 65.	64
		Too great resistance in field rheostat	Bring up to voltage gradually with rheostat, and watch pilot lamp; regulate carefully.	65

Note from line 50. 45= Engine fails to regulate. 46= Overload. 47. Short circuit in armature. 48, Striking or rubbing of armature. 49, Friction. 50, Weak magnetic field.

and Motor Troubles by "F. W. S." on page 36.